

Serial No. 10/036,545

Docket No. P-0328

Amdt. dated January 11, 2005

Reply to Office Action of October 22, 2004

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A mobile electronic equipment with an internal antenna comprising:

a case having an opened portion;

a display panel exposed through the opened portion of the case for displaying text or images;

an electrically conductive panel frame for supporting edges of the display panel, and being positioned within the case; and

an antenna fastened to the panel frame for enabling a radio communication, the antenna being grounded to the panel frame in a state of being inserted in the case, wherein the antenna comprises,

a grounding portion in conductive contact to the panel frame,

a cable fixing portion positioned substantially parallel with and spaced at a distance from the grounding portion, and

a connecting portion connecting the grounding portion and the cable fixing portion, wherein the connecting portion is bent at an angle outwardly from and extended

from an edge of the grounding portion and disposed outwardly from the grounding portion.

2. (Currently Amended) The equipment of claim 1, wherein the ~~antenna comprises:~~  
~~a grounding portion in conductive contact with to the panel frame;~~  
~~a cable fixing portion positioned in parallel with and spaced at a distance from the~~  
~~grounding portion; and~~  
a connecting portion is configured to be bent substantially perpendicular to and  
extended from a respective edge of each of the grounding portion and the cable fixing  
portion to connect ~~connecting~~ the grounding portion and the cable fixing portion.

3. (Original) The equipment of claim 2, wherein the antenna is formed of a metal plate bent in a 'U' shape, and the grounding portion, the connecting portion and the cable fixing portion are integrally formed with one another.

4. (Original) The equipment of claim 2, wherein the cable fixing portion includes a transmitting and receiving portion extended long in a longitudinal direction of the antenna at one side thereof.

5. (Original) The equipment of claim 2, further comprising a coaxial cable with an outer shield conductor connected at one end thereof to the cable fixing portion and a

center conductor thereof connected to a communication control device of the equipment.

6. (Original) The equipment of claim 5, wherein the coaxial cable is disposed to pass between the grounding portion and the cable fixing portion of the antenna.

7. (Original) The equipment of claim 5, wherein the cable fixing portion of the antenna includes a first junction portion where the center conductor of the coaxial cable is connected and a second junction portion where the outer shield of the coaxial cable is connected.

8. (Original) The equipment of claim 2, wherein a hole is formed at one end of the grounding portion, through which engaging members fix the antenna to the panel frame.

9. (Original) The equipment of claim 1, wherein the width of the antenna is the same as or the smaller than that of the panel frame.

10. (Original) The equipment of claim 1, wherein the length of the antenna is the same as or smaller than that of the panel frame.

11. (Original) The equipment of claim 1, wherein the panel frame includes a side

wall formed to surround a side face of the display panel, and the antenna is put in contact with the side wall of the panel frame at the side face of the display panel.

12. (Original) The equipment of claim 1, wherein the case includes a radio communication control device electrically connected to the antenna and an input key which can be operated for inputting by a user.

13. (Original) The equipment of claim 1, further comprises a bracket for fixing the panel frame to the case, and the grounding portion of the antenna is inserted between the bracket and the panel frame.

14. (Original) The equipment of claim 13, wherein the antenna is mounted to the panel frame by a plurality of brackets at both sides of the display panel and grounded to the panel frame.

15. (Original) The equipment of claim 1, further comprising a bracket for fixing the panel frame to the case, the bracket being made of metal and installed to be closely adhered to the panel frame, and wherein the antenna is fixed at one side of the bracket.

16. (Original) The equipment of claim 15, wherein the bracket includes an

antenna fixing portion protruded from a portion thereof closely adhered to the panel frame so that the antenna can be fixed.

17. (Original) The equipment of claim 16, wherein the antenna is formed in a plate shape and fixed to the bracket at the antenna fixing portion.

18. (Original) The equipment of claim 16, further comprising a coaxial cable with one end portion connected to the antenna and the antenna fixing portion and the other end portion connected to a communication control device.

19. (Original) The equipment of claim 18, wherein the bracket includes a cable supporting portion protruded from the portion thereof closely adhered to the panel frame, for supporting the coaxial cable.

20. (Original) The equipment of claim 1, further comprising a main body including a key board which can be operated by a user and a radio communication control device electrically connected to the antenna, and wherein the case is rotatably coupled so as to be folded to the main body or unfolded from the main body.

21. (Canceled)

22. (Original) The equipment of claim 20, further comprising a bracket with one side thereof fixedly contacted with a side wall of the panel frame and another side thereof fixed at an inner wall of the case.

23. (Original) The equipment of claim 22, wherein the grounding portion of the antenna is disposed between the panel frame and the bracket.

24. (Original) The equipment of claim 22, wherein the panel frame includes a screw fixing hole, and the bracket and the antenna each include holes through which a screw may be inserted formed therein at positions thereof corresponding to the screw fixing hole of the panel frame, so that the bracket and the antenna may be fixed to the panel frame by the screw.

25. (Canceled)

26. (Currently Amended) The equipment of claim ~~25~~ 20, wherein the cable fixing portion includes a transmitting and receiving portion at one side thereof, extended in a longitudinal direction of the antenna.

27. (Currently Amended) The equipment of claim ~~25~~ 26, further comprising a coaxial cable with one end connected to the cable fixing portion and the other end connected to the communication control device in the main body.

28. (Original) The equipment of claim 27, wherein the coaxial cable is installed to pass between the grounding portion and the cable fixing portion.

29. (Original) The equipment of claim 27, wherein the coaxial cable fixing portion includes a first junction portion where a center conductor wire of the coaxial cable is connected and a second junction portion where an outer shield of the coaxial cable is connected.

30. (Original) The equipment of claim 20, further comprising a bracket for fixing the panel frame to the case, the bracket being made of metal and installed to be closely adhered to the panel frame, and wherein the antenna is fixed at one side of the bracket.

31. (Original) The equipment of claim 30, wherein the bracket includes an antenna fixing portion protruded from a portion thereof closely adhered to the panel frame so that the antenna can be fixed thereto.

32. (Original) The equipment of claim 31, wherein the antenna is formed in a plate shape and fixed at the antenna fixing portion.

33. (Original) The equipment of claim 31, further comprising a coaxial cable with one end connected to the communication control device in the main body and the other end connected to the antenna, so as to transmit a transmission or reception signal between the communication control device and the antenna.

34. (Original) The equipment of claim 33, wherein the bracket includes a cable supporting portion protruded from a portion thereof closely adhered to the panel frame, for supporting the cable.

35. (Currently Amended) A mobile electronic equipment comprising:  
a main body including a main lower case on which a key board is positioned, a printed circuit board installed at the main lower case and connected to a communication control device, and an upper case coupled to the main lower case[[,]];

a display unit supported by the main body to be rotatable between a first position where the key board is covered and a second position where the key board is uncovered, the display unit comprising:

a cover outer case constituting a cover of the display unit and having a bottom wall and a



side wall;

a display panel mounted at the cover outer case and having a panel frame installed at edges thereof, the panel frame having a side wall;

a bracket with one side thereof fixedly connected with a lateral edge of the panel frame of the display panel and with a fixing portion fixed to the side wall of the cover outer case formed at another side thereof; and

an antenna having a grounding portion and a transmitting and receiving portion, the grounding portion being fixedly connected with the bracket and, wherein the antenna further comprises,

a connecting portion bent perpendicularly and extended from an edge of the grounding portion and disposed outwardly of the bracket, and

a cable fixing portion perpendicularly bent at an edge of the connecting portion,

wherein the transmitting and receiving portion is extended longitudinally at one edge of the cable fixing portion.

36. (Original) The equipment of claim 35, wherein a pair of antennas are installed, one at each side of the display panel.

37. (Original) The equipment of claim 35, wherein the panel frame includes a

screw fixing hole being formed at a side wall of the panel frame, and holes are respectively formed at the bracket and the grounding portion of the antenna corresponding to the screw fixing hole, whereby a screw can be passed the screw fixing hole and the holes of the bracket and the grounding portion simultaneously to fix the bracket and the antenna to the panel frame.

38. (Canceled)

39. (Currently Amended) The equipment of claim ~~38~~ 35, further comprising a coaxial cable with one end connected to the transmitting and receiving portion and the other end connected to the communication control device, and wherein the cable is passed between the grounding portion and the transmitting and receiving portion of the antenna.

40. (Currently Amended) The equipment of claim 35, further comprising a coaxial cable with one end connected to the transmitting and receiving portion and the other end connected to the communication control device, ~~and~~ wherein the cable is passed between the grounding portion and the transmitting and receiving portion of the antenna, and wherein the grounding portion is an integral part of the bracket or passes between the bracket and the side wall of the panel frame.

41. (Currently Amended) A mobile electronic equipment having a main body which contains a communication control device and a display unit with a display panel supported by a panel frame made of metal, the equipment comprising:

an outer case having a bottom wall supporting the display panel and perpendicularly a side wall at an edge of the bottom wall to surround the display panel;

a bracket fixed to the panel frame to support the display panel, with which bracket a case fixing portion is integrally formed for fixing at the outer case;

an antenna fixed at an antenna fixing portion formed at the bracket for transmitting and receiving a signal to and from an external source; and

a coaxial cable with one end connected to the communication control device and the other connected to the antenna, for transmitting a transmission and a reception signal between the communication control device and the antenna, and wherein the antenna further comprises,

a connecting portion bent perpendicularly and extended from an edge of the antenna fixing portion and disposed outwardly of the bracket, and

a cable fixing portion perpendicularly bent at an edge of the connecting portion, wherein the transmitting and receiving portion is extended longitudinally from the cable fixing portion.

42. (Original) The equipment of claim 41, wherein the bracket includes a cable supporting portion for supporting the coaxial cable.

43. (Original) The equipment of claim 41, wherein the coaxial cable is electrically connected to the antenna and the antenna fixing portion.

44. (Currently Amended) A mobile electronic equipment comprising:  
a main body including a main lower case on which a key board is positioned, a printed circuit board installed at the main lower case and connected to a communication control circuit, and an upper case coupled to the main lower case;

a display unit supported by the main body to be rotatable between a first position where the key board is covered and a second position where the key board is uncovered, the display unit comprising:

a cover outer case constituting a cover of the display unit and having a bottom wall and a side wall;

a display panel mounted in the cover outer case and having a panel frame installed at edges thereof, the panel frame having a side wall;

a bracket ~~with~~ configured to extend inwardly from the side wall of the cover outer case with a fixing portion at one side thereof fixedly connected with the side wall of the panel frame, and having a case fixing portion protruded at another side thereof so that the bracket can be fixed at the side wall of the outer case, an antenna fixing portion being formed at the other side of the bracket;

an antenna fixed at the ~~antenna~~ fixing portion of the bracket configured to extend between the fixing portion and the side wall of the cover outer case for enabling a radio communication, the antenna configured to be grounded to the panel frame; and

a coaxial cable with one end connected thereof to the communication control circuit and another end thereof connected to the antenna, so as to transmit a transmission and a reception signal between the communication control device and the antenna.

45. (Currently Amended) An antenna for radio communication installed in mobile electronic equipment, comprising:

a grounding portion grounded to a metal member in the mobile electronic equipment;  
a cable fixing portion formed in spaced parallel relation to the grounding portion, an end of a coaxial cable connected to a communication control device of the mobile electronic equipment being electrically connected thereto; and

a connecting portion ~~connecting~~ configured to be bent substantially perpendicular to and extended from a respective edge of each of the grounding portion and the cable fixing portion to connect the grounding portion and the cable fixing portion.

46. (Original) The antenna of claim 45, wherein the antenna is formed of a metal plate bent in a 'U' shape and includes the grounding portion, the connecting portion and the cable fixing portion which are integrally formed with one another.

47. (Currently Amended) The antenna of claim 45, wherein the cable fixing portion includes a transmitting and receiving portion extended from one edge thereof in a longitudinal direction of the antenna, and wherein the antenna is formed of a metal plate bent in a 'U' shape and includes the grounding portion, the connecting portion and the cable fixing portion each configured to extend in different two-dimensional planes.

48. (Original) The antenna of claim 45, wherein the cable fixing portion includes portions for connecting to a center conductor and an outer shield of the coaxial cable.

49. (New) The equipment of claim 1, wherein the antenna is formed of a metal plate bent in a 'U' shape and includes the grounding portion, the connecting portion and the cable fixing portion each configured to extend in different two-dimensional planes.

50. (New) The mobile electronic equipment of claim 44, wherein the antenna further comprises:

- a grounding portion coupled to the fixing portion of the bracket;
- a connecting portion bent perpendicularly and extended from an edge of the grounding portion and disposed outwardly of the bracket; and
- a cable fixing portion perpendicularly bent at an edge of the connecting portion;

wherein the transmitting and receiving portion is extended longitudinally at one edge of the cable fixing portion.

51. (New) A mobile electronic equipment with an internal antenna comprising:
- a case having an opened portion;
  - a display panel exposed through the opened portion of the case for displaying text or images;
  - an electrically conductive panel frame for supporting edges of the display panel, and being positioned within the case;
  - an antenna fastened to the panel frame for enabling a radio communication, the antenna being grounded to the panel frame in a state of being inserted in the case;
  - a bracket for fixing the panel frame to the case, the bracket being made of metal and installed to be closely adhered to the panel frame, and wherein the antenna is fixed at one side of the bracket, wherein the bracket includes an antenna fixing portion protruded from a portion thereof closely adhered to the panel frame so that the antenna can be fixed; and
  - a coaxial cable with one end portion connected to the antenna and the antenna fixing portion and the other end portion connected to a communication control device.